

AD

(Leave blank)

Award Number: W81XWH-08-2-0190

TITLE: Evaluating PTSD on reproductive outcomes: Women deployed in Iraq
and Afghanistan

PRINCIPAL INVESTIGATOR: Kathleen O'Rourke

CONTRACTING ORGANIZATION: University of South Florida
Tampa, FL 33612

REPORT DATE: october 2009

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: (Check one)

☒ Approved for public release; distribution unlimited

☐ Distribution limited to U.S. Government agencies only;
report contains proprietary information

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) 01-10-2009		2. REPORT TYPE Annual Report		3. DATES COVERED (From - To) 15-09-2008-14-09-2009	
4. TITLE AND SUBTITLE Evaluating PTSD on reproductive outcomes: Women deployed in Iraq and Afghanistan				5a. CONTRACT NUMBER W81XWH-08-2-0190	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Kathleen O'Rourke Email: korourke@health.usf.edu				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) University of South Florida Tampa, FL 33612				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Medical Research and Materiel Command Fort Detrick, MD 21702-5012				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Women represent nearly 15% of the Armed Forces and almost 11% of those deploying to support Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) in Afghanistan. Military women who become pregnant may be exposed to factors that their civilian counterparts are less likely to experience, including Post Traumatic Stress Disorder (PTSD). The purpose of this study is to determine if PTSD and other mental disorders are significantly associated with maternal and newborn outcomes. The proposed study will utilize a secondary analysis of existing military records. In conjunction with our military partners, we have developed and submitted a protocol requesting de-identified data from military databases, and are awaiting receipt of the files. The study design is a retrospective cohort study: we will first define a cohort of women for whom a Tricare delivery hospitalization record can be found, and then link backward to obtain inpatient, outpatient, and screening records with PTSD (and related disorders) diagnosis codes. We will define women who were "exposed" (had a diagnosis of PTSD prior to pregnancy) and "unexposed" (did not have a diagnosis of PTSD), and compare the incidence of pregnancy outcomes for these 2 groups.					
15. SUBJECT TERMS PTSD, pregnancy, women, obstetric					
16. SECURITY CLASSIFICATION OF: U			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 24	19a. NAME OF RESPONSIBLE PERSON USAMRMC
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (include area code)

Table of Contents

	<u>Page</u>
Introduction.....	2
Body.....	3
Key Research Accomplishments.....	17
Reportable Outcomes.....	20
Conclusion.....	20
References.....	21
Appendices.....	22

Introduction

The overall purpose of this study is to examine the association of deployment-related post traumatic stress disorder (PTSD) and related mental disorders with adverse pregnancy outcomes among active-duty military women who have been deployed to Iraq or Afghanistan, and who remained Tricare beneficiaries at the time of their delivery. The study design is a retrospective cohort study: we will first define a cohort of women for whom a Tricare delivery hospitalization record can be found, and then link backward to obtain inpatient, outpatient, and screening records with PTSD (and related disorders) diagnosis codes. These earlier records will allow us to define women who were “exposed” (had a diagnosis of PTSD prior to pregnancy) and “unexposed” (did not have a diagnosis of PTSD). We will compare the incidence of several specific pregnancy outcomes for these 2 groups of women.

We have developed and submitted a data request to Dr. Angelica Eick, Special Studies Lead at the Armed Forces Health Surveillance Center to receive de-identified military records for active-duty military women (of any age) who delivered a liveborn infant or stillborn fetus (≥ 20 weeks gestational age) during calendar years 2004-2008. The study population will be identified using the SIDR inpatient data file, which contains records for current Tricare beneficiaries. Once we receive the requested data, we will conduct analyses of the association of PTSD and other mental disorders with selected maternal and newborn outcomes.

Body

Purpose and Study aims

The overall purpose of this study is to examine the association of deployment-related post traumatic stress disorder (PTSD) and related mental disorders with adverse pregnancy outcomes among active-duty military women who have been deployed to Iraq or Afghanistan, and who remained Tricare beneficiaries at the time of their delivery. The study design is a retrospective cohort study: we will first define a cohort of women for whom a Tricare delivery hospitalization record can be found, and then link backward to obtain inpatient, outpatient, and screening records with PTSD (and related disorders) diagnosis codes. These earlier records will allow us to define women who were “exposed” (had a diagnosis of PTSD prior to pregnancy) and “unexposed” (did not have a diagnosis of PTSD). We will compare the incidence of several specific pregnancy outcomes for these 2 groups of women. This study will address the following specific aims:

- A.1. Specific Aim 1:** Define a cohort of active-duty military women who meet the following inclusion criteria: (a) delivered a liveborn or stillborn infant during 2004-2008; (b) had Tricare hospitalization delivery records for both the mother and infant.
- A.2. Specific Aim 2:** Using the mother’s unique identification number, link backwards in time to obtain deployment records, pre- and post-deployment mental health screening questionnaire results, medical outpatient visit records, and medical inpatient hospitalization records (prior to delivery).
- A.3. Specific Aim 3:** Define maternal exposure status by analyzing prenatal and pre-conceptional medical and screening records for any mention of a PTSD or related mental disorder diagnosis or positive screening test result.
- A.4. Specific Aim 4:** Analyze the cohort data to investigate whether an independent increased risk of adverse pregnancy outcomes existed for the exposed vs. unexposed women, after adjustment for known biomedical and behavioral risk factors for the outcomes.

A.5. Specific Aim 5: Disseminate study findings through presentation at national scientific meetings, publication in peer-reviewed medical journals, and special reports and presentations to DOD audiences as requested.

B. Background and Significance

B.1. Background

Women represent 14.35% of the Armed Forces in 2007 and 10.6% of those deploying to support Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) in Afghanistan. Women soldiers have specific social, medical, and physical needs which need to be addressed to maximize their potential. Given the current military environment of frequent and repeated deployments, women are a critical component of operations in the volunteer force. Addressing the needs of women improves their combat readiness, increases recruitment and retention as well as benefits the woman, her family, and the military community as a whole. The mean age of soldiers in the military is 29 years with 65% aged 30 or younger, prime reproductive years. In fact, pregnancy and pregnancy-related conditions are the leading causes for hospitalizations among active duty soldiers and actually account for 21% of the total hospitalizations in the military health system. Thus, the effect of women's military service on reproductive outcomes is a key concern. Due to the unique situation of women in the military, enlisted women who become pregnant may be exposed to factors that their civilian counterparts are less likely to experience. A soldier's exposure to PTSD as a consequence of deployment is one example of recent concern. A recent study found women who had deployed to Iraq/Afghanistan from 2001-2006 had a cumulative post traumatic stress disorder (PTSD) incidence of 2.3% [1]. This

condition may have many effects on women's health, including implications for current and future reproductive health.

Thus far, few studies have specifically examined the association between PTSD and its symptomatology on adverse pregnancy outcomes. An OVID search using the key words PTSD and pregnancy outcomes, identified 271 studies, most of which were concerned with stress resulting from pregnancy. From this search, a total of seven studies analyzing the effect of PTSD on pregnancy outcomes were identified. Six used primary data collection and one was an analysis of pre-existing data. The majority of studies were limited by small sample sizes and difficulties in identifying the temporality of PTSD. Studies identified PTSD using varied methodologies and examined a number of different outcomes.

In general, the studies had mixed results and no consistent pattern was demonstrated. A secondary analysis of data conducted by Seng et al. the Michigan's Medicaid Eligibility and Paid Claims records, utilized the ICD-9 diagnostic code of 309.81 from hospital records and billing forms[2]. Five variables were found to be significant using regression analysis: ectopic pregnancy (OR=1.7, 95% CI 1.1-2.8); miscarriage (1.9, 1.3-2.9); hyperemesis (3.9, 2.0-7.4); preterm contractions (1.4, 1.1-1.9); and excessive fetal growth (1.5, 1.0-2.2). Significant findings were not found in relation to preterm birth, gestational diabetes, pre-eclampsia, c-section delivery and other obstetric variables. This study could not assess PTSD temporality and the overall prevalence was relatively low (0.4%), possibly resulting from under-reporting. Rogle et al conducted a study among 1100 pregnant (31 cases and 1079 controls) women enrolled in the

Health Start initiative[3]. They did not find any significant relationship between PTSD and obstetric outcomes, although women with PTSD had higher rates of preterm birth than controls, 16.1% vs. 7.0%, respectively. They also identified an association between minor depressive disorder and low birth weight. This study was limited by small numbers of women diagnosed with PTSD. A study of 2,549 women (182 with PTSD and 2,367 controls) in New York City evaluated the impact the World Trade Center attack but did not find any relationship between women with PTSD and intrauterine growth retardation [4]. However, a secondary analysis of these data did identify an association between PTSD and decreased fetal head circumference[5]. Xiong et al evaluated the relationship of PTSD in a sample of women exposed to Hurricane Katrina and although they found higher rates of low birth weight among women with PTSD, this finding was not significant[6]. A relatively small study (n=101) by Morland et al. evaluated the impact of PTSD on various health behaviors during pregnancy and found women with PTSD were more likely to smoke, abuse alcohol and drugs, and have poor prenatal care but the study did not have sufficient power to identify pregnancy outcomes[7]. A pilot study with 25 subjects did determine that women who experienced PTSD had lower basal salivary cortisol levels but they did not examine pregnancy outcomes[8].

Although there have been few studies evaluating the impact of PTSD on pregnancy outcomes, research has identified an association between maternal stress and poor pregnancy outcomes, including preterm delivery (birth prior to the 37th week of gestation) and low birth weight (birth of an infant less than 2500 grams). Associations are not limited to stress occurring during pregnancy may be the result of cumulative stressful experiences prior to conception.

Collectively low birth weight and preterm delivery account for 50-70% of perinatal mortality and are also strongly associated with perinatal morbidity and high health care costs. Current estimates of low birth weight and preterm delivery in the United States are 8.1% and 12.3%, respectively [9]. Little is known about the association of PTSD with pregnancy outcomes as PTSD is a rarely diagnosed condition among civilian women of childbearing age. While no studies evaluating the relationship of PTSD with pregnancy outcomes were found in the military population, Haas et al. reported that women with partners who were deployed had higher levels of stress and suggested this could impact pregnancy outcomes [10]. In addition, Stinson et al found a trend towards preterm labor with a higher level of perceived negative life events among military women [11]. See table 1 for a review of the selected studies.

The proposed study should provide important information on the impact of PTSD on pregnancy outcomes. It has advantages over the prior studies as, given the number of deployed women in the military, it should be possible to identify sufficient numbers of participants with and without PTSD. It is also possible to address the issue of temporality as women complete both a pre and post deployment health assessment so responses can be compared between the two time periods. We recognize the limitation in diagnosing PTSD but the inclusion of other mental disorders should add to our understanding of the relationship of stress, depression, and anxiety with PTSD.

B.2 Military Significance

This study has a number of implications for the military. Of primary importance, it will establish the feasibility of using the existing military data to identify the impact of PTSD on pregnancy

outcomes. If this methodology is feasible, it has important implications both for women in the military diagnosed with PTSD as well as implications for future research possibilities. Pregnancy complications can be very costly to woman, both emotionally and financially, as well as result in significant personnel and financial costs to the military. If an association were to be found between PTSD and pregnancy outcomes, women could be counseled about this risk, and interventions could potentially be implemented. Additionally this study could provide a template for a method to use existing military data to explore associations of other exposures with pregnancy outcomes among women in the military as well as to evaluate other outcomes potentially associated with PTSD and mental health concerns among the general military personnel.

Table 1. Review of research studies of PTSD and pregnancy outcomes.

Author	Year	Location	Size	Exposure	Outcome	Stat. sig. association?	Findings
PTSD							
Berkowitz	2003	USA	182	probable PTSD	IUGR, PTB, LBW	No	No diff w/prob PTSD & RR of PTB (p=.88), LBW (p=.22) or IUGR (p=.94)
Engel*	2005	USA	52	probable PTSD, PTSS	gestational age, head circumference, birth weight	Yes (PTSS + assoc w/age, - assoc w/circ; mod depr + assoc w/age); no (PTSD, BDI, STAI, LEI & PTB, LBW, circ)	1-unit inc in PCL asso w/gest age .04 wks inc, head circ .07 dec; prob PTSD not asso p>.05; mod depr w/age p=.05
Morland	2007	USA	101	PTSD, state-anxiety, depr symp	Mat behav health & poor birth out (lab, del compl, cong anom, LBW, mode deliv, etc)	Yes (poor behavioral health, anx, depr); no (birth outcomes)	All poor hevavioral, anx, depr more w/PTSD (p<.05)
Rogal	2007	USA	1100	PTSD; major, minor depressive & panic disorder	LBW, birth weight, PTB, gestational age	No; yes, minor depr	sub abuse, panic, maj, min occur more w/PTSD (p=.008); PTB risk trend lvl; non-sig w/PTSD, maj, min, panic; min depr on LBW adj OR=1.82 (1.01-3.29) w/p</.05
Seng	2005	USA	25	PTSD	Low basal cortisol, worse peri outcomes	Yes	Cortisol diff btn grps (p=.01); PTSD symp sig neg corr (r = -.0725, p<.000) w/OI
Seng	2001	USA	1093	PTSD	spont AB, ect preg, STDs, nausea, vomit & hyper, PT cont, postdate gest, fetal wt	Yes (ect preg, spont AB, Ptcont, macro, hyperem; no (GDM, pre-ec, labor diff)	Drug abuse sig more w/PTSD (p<.001); spont AB, excess vomit sig after Bonferroni correction (p< .002); ect preg, PT cont, exc, poor fetal growth marg sig
Xiong	2008	USA		PTSD & depression	LBW, PTB	No	High freq LBW 3.1 (.79-12.6), 1.3 (.42-3.79); low freq PTB .8 (.10-6.39), .7 (.19-2.56), p>.05; stat sig w/>3 hurr exp

C. Research Design and Methods

C.1 Study Population

Our study population will consist of active-duty military women (of any age) who delivered a liveborn infant or stillborn fetus (≥ 20 weeks gestational age) during calendar years 2004-2008.

The study population will be identified using the SDR inpatient data file, which contains records for current Tricare beneficiaries. Therefore, active-duty military women who have babies but do not use Tricare will not be captured by our study. We will attempt to quantify the % of active-duty births that are missed by our method. Secondly, we will also miss women who become pregnant while on active-duty but leave the military prior to delivery (and do not use Tricare). However, women who leave the military while pregnant are often eligible for Tricare coverage for their labor and delivery costs, so we may still capture data for some of these women.

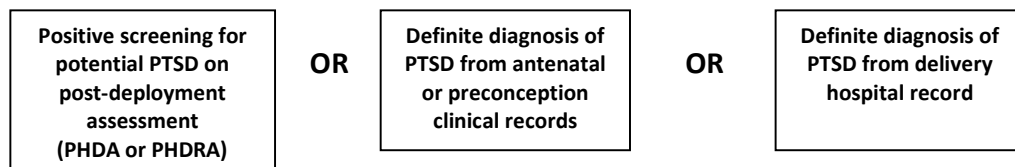
Additional inclusion and exclusion criteria are described below under C.2. Measurement of Exposure and C.3. Measurement of Outcomes.

C.2. Measurement of Exposure (PTSD)

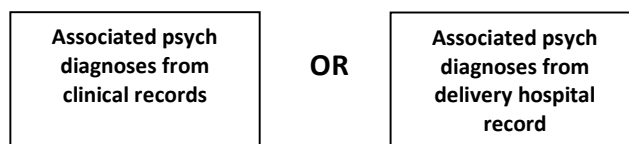
In this study, we are focused on deployment-associated diagnoses and symptoms of PTSD. We recognize that there will be a background prevalence of PTSD in a female military population (consequent to non-combat personal traumatic experiences). We will take a conservative approach to defining exposure in this study. Active-duty military women who were deployed to either Iraq or Afghanistan during 2003-2008, and subsequently tested positive for PTSD in one of the specific ways listed below will be considered “exposed”. We will conduct sub-analyses

limiting the population to only individuals with an ICD9 code indicating PTSD as we are aware that a positive screening on the PHDA or PHDRA is not a diagnosis.

Must have at least 1 of the following:



Subgroup analyses will consider with other psychiatric or substance abuse diagnoses:



We will investigate 2 groups of “unexposed” women - (1) those who were deployed but had no PTSD or related diagnoses, and (2) those who were not deployed AND had no PTSD or related diagnoses. Women with no deployment history but positive diagnoses of PTSD will be excluded from our study analyses but will serve to identify the baseline measure of PTSD in the military population.

We will use multiple data sources to define prenatal and/or preconceptional experiences of PTSD. The first source will be the post-deployment screening assessment questionnaire. Other sources will include outpatient medical visits (of any sort) – we will scan the multiple diagnosis codes available in these records for PTSD codes and related mental disorder/substance abuse codes. We will also link inpatient hospitalization records for the same diagnosis codes. For each individual woman, there will be the possibility of multiple indicators of PTSD/mental disorders.

Therefore, our data analyses will take into account multiple levels/indicators of severity and also the level of specificity of the screening/diagnosis indicators. **C.3. Measurement of**

Outcomes (Maternal and Fetal/Infant Complications)

Adverse Outcomes for Mother

Our study is exploratory; consequently we will examine multiple adverse outcomes for the mother for which there is a plausible pathophysiological pathway between PTSD and the outcome. We will examine maternal complications for three distinct time periods: prenatally, peripartum (e.g. during labor and delivery), and postpartum. We will evaluate detailed ICD-9 diagnosis codes and procedure codes from prenatal outpatient clinical records and from the delivery hospitalization record to identify these complications. We will also examine the method of delivery (vaginal vs. cesarean).

Prenatal Complications	Peripartum Complications	Postpartum Complications
gestational diabetes hypertension preeclampsia infections drug/alcohol use hyperemesis	premature membrane rupture preterm labor hemorrhage failure to progress prolonged labor	hemorrhage stroke infections depression

Adverse Outcomes for Infants

Adverse infant outcomes are recorded on both the mother's and the infant's hospital discharge record. For example, a stillbirth will be recorded on the mother's record. There is also a

diagnosis code to indicate whether the baby is low birth weight. More detailed information will be available for those cases in which the infant discharge record is successfully linked to the mother's record. We will examine the following infant outcomes: preterm birth, low birth weight, stillbirth, infant death, congenital defects, and other infant complications that can be ascertained through diagnosis and procedure codes.

Military, demographic, and potential confounding variables

If there is a real effect of PTSD on pregnancy outcomes, one challenge of our study will be to isolate this causal influence from other factors that impact our outcomes. Previous research has identified many risk factors for adverse pregnancy outcomes of both mother and infant, therefore control of potentially confounding variables will be a critically important part of our analyses. We will identify demographic, behavioral, and biomedical risk factors for each woman through the administrative and clinical outpatient records in our study dataset.

C.4. Data Sources, Variables Requested, and Data Linkage Strategy

The table below details the data sources, selection criteria, and variables requested from each data source. As stated above, our study population will include all active-duty military women for whom a hospital delivery record can be located for the period January 1, 2004 – December 31, 2008. From this defining datafile, master list of social security numbers will be generated and used to link all subsequent datafiles listed in the table. We recognize that not all women

will have links to all the data sources. For example, women who were never deployed to Iraq or Afghanistan will not have a post-deployment health assessment record. However, these women are an important part of our control (unexposed) population and will be included in our analyses for comparison purposes.

We request that a scrambled identification number be generated for each study subject, and that these scrambled numbers be consistent across the multiple datasets we will link and analyze. This will allow us to link multiple records without the possibility of identifying any of the individuals.

Table 2. Data sources and codes for requested study variables.

Data Source	Selection Criteria	Variables Requested
SIDR (Mom's Delivery Records)	<ul style="list-style-type: none"> * Active-duty women * Live birth or stillbirth * Delivery date 01/01/04 - 12/31/08 * Obtain delivery date from linked mom-baby inpatient records * For stillbirths or mom records for which an infant record can not be linked, designate delivery date = mother's admission date + 1 day. 	<ul style="list-style-type: none"> * scrambled ID # * dates of admission and discharge * discharge disposition type * mother's age, race/ethnicity, marital status, military rank * principal and all secondary ICD-9 diagnosis codes * principal and all secondary ICD-9 procedure codes * hospital location (i.e. country and state)
SIDR (Infant Discharge Record)	<ul style="list-style-type: none"> * Match to Mom's record by sponsor SSN for discharges 2004 - early 2009 	<ul style="list-style-type: none"> * scrambled ID # * dates of admission and discharge * infant date of birth * discharge status and destination * race/ethnicity and gender * principal and secondary ICD-9 diagnosis codes * principal and secondary ICD-9 procedure codes * procedure dates
Post Deployment Health Assessment (PDHA)	<ul style="list-style-type: none"> * Match to master list of Mom SSNs 	<ul style="list-style-type: none"> * scrambled ID # <u>Service members' section</u>

Data Source	Selection Criteria	Variables Requested
(older version)	* Jan 2002 – Dec 2007	<ul style="list-style-type: none"> * Today's date (Date post deployment health assessment obtained) * Name of unit during this deployment * Service branch * Pay grade * Year of birth * Date(s) of arrival into theater * Date of departure from theater * Name/location of Operation * Occupational specialty during the deployment * Combat specialty * Questions 1-5 on overall health * Question 6 symptom checklist * Questions 7-13 * Questions 24-27 <u>Health care providers' section</u> * Questions 1-6 * Referral for: combat/stress, family, fatigue, mental health, pregnancy, other * Exposure concerns: all
Post Deployment Health Re-Assessment (PDHRA) (older version)	<ul style="list-style-type: none"> * Match to master list of Mom SSNs * Jan 2002 – Dec 2007 	<ul style="list-style-type: none"> * scrambled ID # <u>Service members' section</u> * Today's date (Date post deployment health assessment obtained) * Marital status * Date(s) of arrival into theater * Date of departure from theater * Service branch * Status prior to deployment * Pay grade * Location of Operation * Since return from deployment I have * Total deployments in past 5 years * Current unit of assignment * Current assignment location * Questions 1-6 on overall health * Question 6a symptom checklist * Questions 7-16 <u>Health care providers' section</u> * Questions 1-4 * Question 5: depression, PTSD, anger, suicide, social, alcohol, other * Question 6: a-c, d (OB/GYN only) e-n * Question 9: declined form, declined interview, declined referral
Post-Deployment Health Assessment PDHA 2008 version	<ul style="list-style-type: none"> * Match to master list of Mom SSNs * Jan – Dec 2008 	<ul style="list-style-type: none"> * Date * Year of birth, gender * Pay grade * Name of deployment unit, Service Branch, Component * Name of Operation, Date of arrival, Date of departure, Location

Data Source	Selection Criteria	Variables Requested
		<ul style="list-style-type: none"> * Occupational and combat specialties during deployment * Questions 1-20 (inclusive, all parts) * Questions 24-27 <u>Health Care Provider Section</u> <ul style="list-style-type: none"> * Questions 1-7 * Questions 9-10 * Question 11: combat, depression, PTSD, anger, suicide, social, alcohol, other * Question 12: a-c, OB/GYN, e-l * Question 13 * Question 14: declined form, declined interview, declined referral
Post-Deployment Health Re-Assessment PDHRA 2008 version	<ul style="list-style-type: none"> * Match to master list of Mom SSNs * Jan – Dec 2008 	<ul style="list-style-type: none"> * Date * Year of birth, gender, marital status * Date arrived, date departed, location of operation * Service branch, pay grade * Status prior to deployment * Since return from deployment * Total deployments * Current unit, current location * Questions 1-18 (inclusive, all parts) <u>Health Care Provider Section</u> <ul style="list-style-type: none"> * Questions 1-7 * Question 8: a-c, OB/GYN, e-l * Question 11: declined form, declined interview, declined referral
Active-Duty Administrative and Personnel Data	<ul style="list-style-type: none"> * Match to master list of Mom SSNs * Match dates to infant delivery date * Obtain entry into service update following each deployment 	<ul style="list-style-type: none"> * scrambled ID # * Date of entry into service * Branch * Rank * Educational level * Marital status * Dual military family * Approximate date of discharge when available * Type of discharge * MOS (military occupational specialty-enlisted) * AOC (Area of Concentration-Officers)
SIDR (Mom Prepregnancy and Antenatal Hospitalizations)	<ul style="list-style-type: none"> * Match to master list of Mom SSNs AND earliest deployment dates * For the period 2001 – 2008, capture any records with ICD-9 diagnosis codes 290-319, 630-677, V11, V79 * For the 12 months prior to date of infant delivery, capture all records hospitalizations 	<ul style="list-style-type: none"> * scrambled ID # * dates of admission and discharge * discharge status and destination * marital status * principal and secondary ICD-9 diagnosis codes * principal and secondary ICD-9 procedure codes * procedure dates * hospital type and location (i.e. country and state)

Data Source	Selection Criteria	Variables Requested
SADR (Mom Prepregnancy and Antenatal Outpatient Records)	<ul style="list-style-type: none"> * Match to master list of Mom SSNs AND earliest deployment dates * For the period 2001 – 2008, capture any records with ICD-9 diagnosis codes 290-319, 630-677, V11, V79 * For the 12 months prior to date of infant delivery, capture all records 	<ul style="list-style-type: none"> * scrambled ID # * date of visit * marital status * principal and secondary ICD-9 diagnosis codes * principal and secondary ICD-9 procedure codes * procedure dates * clinic type and location (i.e. country and state)
Pre-Deployment Health Assessment	<ul style="list-style-type: none"> * Match to master list of Mom SSNs 	<u>Service members' section</u> <ul style="list-style-type: none"> * Today's date (Date post deployment health assessment obtained) * Deploying Unit * Service branch * Pay grade * Date of birth * Questions 1-8 health assessment <u>Health care providers' section</u> <ul style="list-style-type: none"> * Referral indicated * Final Medical Disposition * Deployable/Not deployable

C.5. Protection of Privacy

All datafiles provided to us by the Armed Forces Health Surveillance Center (AFHSC) will be de-identified with names and social security numbers removed. Mother's date of birth will also be masked; however all other dates will be included as necessary for analysis. AFHSC will create a scrambled unique identification number for each mother, which will allow us to link and analyze the multiple de-identified datasets needed for our study (e.g. SDR, SADR, PDHA). We will follow standard protocols to ensure security of the datasets; all analyses will focus on groups and statistical aggregates, and no results for any individual person will be reported in any format.

D. Key Research Accomplishments

We have reviewed the literature to identify meaningful associations between PTSD and other mental health disorders with maternal and newborn pregnancy outcomes. While there are few studies of PTSD and pregnancy outcomes, we have based our review on studies evaluating the impact of stress on pregnancy outcomes. We have prioritized the following outcomes, based upon this review and the availability of records: stillbirth, preterm birth, low birth weight, gestational diabetes, hypertension, pre-eclampsia, eclampsia, and hyperemesis gravidarum as well as infant death, congenital defects, and other infant complications. The request for the data was submitted to Dr. Angelica Eick, Special Studies Lead at the Armed Forces Health Surveillance Center.

On September 21st we received a SAS file with data on 81,299 hospitalizations among women with a live born or stillborn infant delivery from 2004 through 2008. Tables 2 and 3 present preliminary analyses of the study data and are subject to revision. Table 2 presents a summary of key demographic and obstetrical characteristics of the women who delivered these infants.

Table 2. Preliminary characteristics of active duty military women who delivered live born infants or stillborns (>20 wks) between 2004 and 2008.

	N		X	SD	Median
Age at delivery	81,266		25.6	4.9	24.0
Race	81,299				
Asian-Pacific Islander		4,324 (5.3)			
Black		23,293 (28.7)			
Hispanic		10,465 (12.9)			
American Indian- Alaska Native		1,916 (2.4)			
Other		792 (0.9)			
White		38,668 (47.6)			
Don't know		1,841 (2.3)			
Marital status	81,299				
Married		58,397 (71.8)			
Single, never married		19,713 (24.3)			
Other		3,099 (3.8)			
Unknown		90 (0.1)			
Military grade	81,299				
Enlisted		70,912 (87.2)			
Officer		10,134 (12.5)			
Warrant Officer		253 (0.3)			
Delivery year	81,267				
2004		16,728 (20.6)			
2005		16,585 (20.4)			
2006		16,164 (19.9)			
2007		16,317 (20.1)			
2008		15,437 (19.0)			
Number of stillbirths	81,299	502 (0.6)			
Single stillborn V27.1					
Twins (1 stillborn) V27.3					
Multiples (some live born) V27.6					
Multiples (all stillborn) V27.7					
Pregnancy hypertension		8,603 (10.6)			

Table 3. Preliminary characteristics of infants born to active duty military women between 2004 and 2008. N=69,575

	N	(%)
Gender		
Male	35,732	(51.4)
Female	33,842	(48.6)
Low birth weight	2,727	(3.4)
Small for gestational age	1,397	(2.0)

E. Reportable Outcomes

There were two presentations on the research projects.

1. O'Rourke K, Pathak E, Roddy M, and Custer M. The Association of Post Traumatic Stress Disorder with Pregnancy Outcomes among Women in the Military, Poster and Oral presentation at the Military Health Research Forum 2009, Kansas City, MO 8/31/09-9/3/09.
2. O'Rourke K and Coulter M. The impact of PTSD on pregnancy outcomes among women in the military. Oral presentation at the 12 Annual Force Health Protection Conference, Albuquerque, NM, August 2009.

F. Conclusion

We have identified potential live births or stillbirths during the study period, as presented previously in Tables 2 and 3. We are just beginning data analysis and will initially evaluate two hypotheses:

1. Is there an the association of PTSD and other depressive orders with low birth weight and preterm birth, and
2. Is there an association of PTSD and other depressive disorders with hypertension in pregnancy?

G. References

1. Editor, *Mental Health Encounters and Diagnoses Following Deployment to Iraq and/or Afghanistan, U.S. Armed Forces, 2001-2006*. Medical Surveillance Monthly Report, 2007. **14**(4): p. 2-8.
2. Seng, J.S., et al., *Posttraumatic stress disorder and pregnancy complications*. Obstetrics & Gynecology, 2001. **97**(1): p. 17-22.
3. Rogal, S., et al., *Effects of posttraumatic stress disorder on pregnancy outcomes*. Journal of Affective Disorders, 2007. **102**(1-3): p. 137-43.
4. Berkowitz, G.S., et al., *The World Trade Disaster and intrauterine Growth Restriction*. Journal of the American Medical Society, 2003. **290**(5).
5. Engel, S.M., et al., *Psychological trauma associated with the World Trade Center attacks and its effect on pregnancy outcome*. Paediatric and Perinatal Epidemiology, 2005. **19**(5): p. 334-41.
6. Xiong, X., et al., *Exposure to Hurricane Katrina, post-traumatic stress disorder and birth outcomes*. American Journal of the Medical Sciences, 2008. **336**(2): p. 111-5.
7. Morland, L., et al., *Posttraumatic stress disorder and pregnancy health: preliminary update and implications*. Psychosomatics, 2007. **48**(4): p. 304-8.
8. Seng, J.S., et al., *Cortisol level and perinatal outcome in pregnant women with posttraumatic stress disorder: a pilot study*. Journal of Midwifery & Women's Health, 2005. **50**(5): p. 392-8.
9. Martin, J., et al. *Preliminary Births for 2004: Infant and Maternal Health*. 2007 [cited; Available from:
<http://www.cdc.gov/nchs/products/pubs/pubd/hestats/prelimbirths04/prelimbirths04health.htm>.
10. Haas, D., L.A. Pazdernik, and C. Olsen, *A cross-sectional survey of the relationship between partner deployment and stress in pregnancy during wartime*. Womens Health Issues, 2005 Mar-Apr. **15**(2): p. 48-54.
11. Stinson, J.C. and K.A. Lee, *Premature labor and birth: influence of rank and perception of fatigue in active duty military women*. Military Medicine, 2003 May. **168**(5): p. 385-90.

H. Appendices

None